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Agricultural Economics Research

APRIL 1969 Vol. 21, No. 2

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UNITED STATES DEPARTMENT OF AGRICULTURE • Economic Research Service

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Agricultural Economics Research

A Journal of Economic and Statistical Research in the United States Department of Agriculture and Cooperating Agencies

APRIL 1969 Vol. 21, No. 2

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Some Thoughts on Agricultural Marketing Research

By Alden C. Manchester

IN SPITE OF MORE than 50 years of marketing research in the U.S. Department of Agriculture and the agricultural experiment stations and 20 years of greatly increased emphasis under the stimulus of the Research and Marketing Act of 1946, the justification for, objectives of, and scope of such research remain a subject for extended discussion.

Justifications for marketing research in public institutions have ranged from the straightforward goal of obtaining for farmers a larger share of the consumer's dollar for food and fiber, through improving efficiency of the marketing system *(11)*[1] to the search for objective truth *(10)*. It seems unlikely that many engaged in or responsible for this area of research would care to be ranked among those opposed to any of these goals. Yet they remain less than completely satisfactory. We seek a goal somewhat more specific than the search for truth and more nearly attainable than increasing the farmer's share of the consumer's dollar.

Perhaps we can put the question in somewhat better perspective if we consider what the economist engaged in marketing research is equipped to do. He has available to him the tools of economic analysis—theory and research methods relevant to the problems at hand. He has no special knowledge of the goals of society or superior means of judging good or bad, better or worse. And, perhaps most important of all, he has no means of putting his conclusions and recommendations into practice. This must be done by others, either those engaged in the practice of marketing farm products or those responsible for the creation and execution of public policy and programs. Thus, marketing research cannot make the marketing system more efficient. It can provide a better understanding of the marketing system and of possible changes in it which others can put into operation if they choose, thereby improving the efficiency of the system.

[1] Italic numbers in parentheses refer to items in the References, p. 33.

Thus, if this premise is accepted, the justification for marketing research must be seen in terms of improving understanding of the operations of the marketing system both as it exists and as it might exist under a variety of postulated conditions, in order to assist decision-makers in both the private and the public sectors to make better-informed choices among alternatives.

Limits

Marketing consists of the activities of the economic system which occur beyond the point of farm production and short of the act of consumption. The traditional dividing line of the farm gate is no longer a useful guide, since many marketing functions are now performed on farms, including in many cases grading and packaging—for one example, eggs. Harvesting and its equivalent for animal products are still defined as a part of production, although many interrelationships exist between production and harvesting practices and marketing problems. In short, the distinction between production and marketing can no longer be made in terms of the agent but must be stated in functional terms. It goes without saying that many research problems will involve both production and marketing functions which are closely interrelated. The distinction is chiefly in terms of the focus of a problem— is it more marketing-oriented than production-oriented—not, is it a marketing agency problem rather than a farm problem.

The marketing system is the complex of private and public agencies which impinge upon the marketing process. It includes the traditional marketing firm from processor, packager, and wholesaler to retailer and all of the public agencies and programs which have a relationship to the marketing process, including regulatory and service programs of national, State and local governments.

Efficiency is defined in the broadest terms to include both operational and pricing efficiency. Operational

efficiency is often thought of as more an engineering concept than an economic one, involving the relatively simple concept of obtaining a greater output for the same physical inputs or the same output for smaller quantities of physical inputs. Pricing efficiency involves all aspects of the market other than operational efficiency. Probably it is best understood by visualizing this aspect of the marketing system as a communication system passing information on consumers' wants and desires back to retailers, processors, and producers, and their reactions forward through the system–with both types of messages being modified and reinterpreted by the participants in the marketing process.

The measurement of pricing efficiency is not as clear-cut as that of operational efficiency. While it can be defined in comparable terms–the ratio of resources utilized as inputs in the communications process to the output of information obtained from the system–we have not yet evolved suitable measurements of either the quality or quantity of information provided.

Goals

We have said that all marketing research is intended to provide information useful to decision-makers in both the public and private sectors of the economy. Clearly, a great deal of research in this area, if competently conducted and clearly presented, will be useful to people in both public and private institutions. We would not have it otherwise if we could. It also seems clear that a substantial number of individual pieces of research considered alone will be of use primarily to managers and executives of private marketing firms. Economic-engineering studies dealing with the physical efficiency of performing specific operations fall in this category, but they also supply essential elements of the "big picture" of the marketing system or a major segment of it. In other words, they are building blocks without which important public policy questions cannot be analyzed.

The goal of the great majority of marketing research projects is not to "solve a problem." Research can analyze the alternative adjustments so that the appropriate decision-makers can select a "solution" with fuller comprehension of the implications of their choices. Even such a "solution" is never final. The solution becomes a parameter of the altered marketing system which creates new problems seeking solutions.

The Uses of Theory

All research, whether it be in marketing, production, resource use, or elsewhere, rests upon a foundation of the appropriate economic theory. This is both the hope and the peril of the researcher. Without relevant theoretical models, he has little hope of performing research useful to decision-makers. At the same time, the researcher must be ever mindful of the basic truth that theory is a simplification of reality. He is forever faced with a choice between the elegance of Chamberlin *(2)* or Bain *(1)* and the richness of John M. Clark *(3)*.

He cannot have it both ways. Despite his best efforts at compromise, he must finally choose between the elegance of a precise theoretical formulation and the messiness of a more accurate description of empirical reality. This is not to say that the research economist should proceed from a basis of sheer empiricism, but that he must examine the theory he proposes to use at least as carefully as he examines the characteristics of the woman he proposes to marry–to determine her relevance to the task proposed.

Description, Analysis, Projection

Ever since F. L. Thomsen consigned all descriptive research to perdition over 20 years ago *(11)*, the ultimate insult has been to characterize a competitor's work as "mere description." The grain of truth in the statement has grown into a pile of monstrous boulders blocking the path to acceptance of much highly useful work. The fact is, of course, that it is impossible to do useful empirical work without knowing what goes on in the marketing system–that is to say, without an adequate description of what exists.

The message of Thomsen and countless others was not that description was either evil or useless but that it was not enough. Description must provide a basis for analysis. In other words, description must be carried out in terms related to the analyses which are to follow.

The broad outline of the complete research enterprise has been characterized by George Rogers as "describe-analyze-project" (7). In short, the objective is to describe the situation in sufficient detail and with sufficient accuracy to make possible meaningful analysis of the key relationships, with the ultimate objective of projecting them into the as-yet-unknown. Projection may be through time or in the "if-then" sense of results of possible alternative courses of action.

Another aspect perhaps more important is that we must progress from "mere description" to what has been called "analytical description." In other words, in describing the marketing system, we must be constantly on the lookout for relationships. This requires an adequate theoretical background and a ready appreciation of the inadequacies of theory and the realities of the marketplace.

Marketing research has made very substantial strides in this direction in the past 15 years. Research reports by public institutions which merely tabulate the results of the survey appear much less frequently now than in the early 1950's and late 1940's. In part, this is due, of course, to the backlog of research information available. It is simply no longer necessary to carry on many of the surveys which provided basic data in the earlier days. At the same time, the increased ratio of analysis to "mere description" reflects the higher level of sophistication in the profession and, to some extent, the preoccupation with mathematical models and econometric research. In part, it also reflects the increased sophistication of graduate training programs and the marked shift in the proportion of Ph.D. candidates compared with Master's students.

In general, our theory–for obvious reasons–recognizes few differences between enterprise units except perhaps in size and location. One of the uses of description is to recognize the many differences among firms. One implication of this is that marketing research should be conducted on a sufficiently disaggregated basis so that important differences among groups of firms are recognized. For some purposes, the aggregate of all firms may be the appropriate measurement, but for a great many–probably most–some disaggregation is required in analyzing the impacts of alternative courses of action.

Marketing Research and Policy Questions

Marketing research in public institutions is–or should be–designed to provide information useful to decision-makers in analyzing questions of public policy. A relatively small number of these questions deal with legislative matters–what would be the effects of a proposed new law or change in existing law? These effects must be analyzed in a very wide variety of dimensions.

A second group of questions–much more numerous than the first–deals with administrative decisions. These range from the issuance of regulations under the many regulatory laws enforced by Federal, State, and local governments through decisions about the complex of prices and price differentials under price support programs, milk marketing orders, and State milk control. They include many questions relating to marketing services provided at all levels of government. Would an extension of market news coverage to include dressed beef in Dallas and Fort Worth significantly improve the operation of the marketing system or would it merely put into published form information already readily available to the participants in the market? What would be the effect of the abolition of the U.S. grades for lamb on the competitive position of lamb producers in the West compared with those in the Midwest and East, and upon various groups of processors, wholesalers, and retailers? What is the effect of special provisions in the Federal raisin marketing order upon the competitive position and incomes of producers and processors and those of different groups of producers and processors?

A third group of questions deals with providing information and analysis to form the basis of the positions taken by public officials and private citizens on matters which are neither legislative nor administrative. These questions are probably the most numerous. In the last 3 or 4 years, the usefulness of fairly substantial resources invested in the measurement of prices and marketing margins at various levels has become more evident as livestock and meat prices rose and fell with the turns of the cattle and hog cycles. The absolute necessity for up-to-date and objective information on prices and marketing margins at all levels has been emphasized and reemphasized. Concomitantly, the need for more accurate measures of prices has become increasingly evident.

Similarly, the issues of "freedom" versus "control" cry out for detailed and objective research as the basis for taking positions. While these issues ultimately will be resolved through legislative and administrative decisions, very extended public discussions of the issues must precede such decisions. Research on specific issues can do much to phrase these questions in terms of real choices rather than battles over platitudes. Such choices are seldom between absolutes. They are more often between a little more or a little less. How much is the freedom to ride the boom and bust of the cattle cycle worth–is it worth as much as broiler producers have given up by signing contracts transferring the gains and losses from the cycle to processors?[2] Researchers cannot answer this question in terms of the value systems of

[2] This, of course, begs the question of whether broiler producers in new areas where most of the broilers are now produced ever had this freedom, since they were put into business by the integrators.

cattle producers compared with broiler growers, but they can spell out many of the results of changes in the marketing system.

The Scope of Marketing Research

It is apparent from the foregoing that to answer these questions marketing researchers need to know everything about everything–obviously an impossibility. The American economy is highly dynamic. The marketing system we seek to describe and analyze is constantly changing, with the inevitable result that the task of marketing research is never completed. No problem is ever solved. It is only analyzed as it now exists and within the framework of a few simplifying assumptions about possible changes.

No problem is ever satisfactorily analyzed in vacuo. We are eternally concerned with interrelationships–between the parts of the marketing system, between the demands for different commodities, between prices in one area and another, between the results of public and private decisions.

To provide meaningful analyses relating to a very wide range of these problems, we must have technical coefficients–costs–for each function within the marketing system. Then we can shed light on a question such as: Are margins too high, either in relation to the costs of existing firms operating as they now do or to the costs which would be incurred under a more nearly optimal system?

Needs are by no means confined to the costs of performing physical functions, i.e., to the problems of operational efficiency. Needed more, and much harder to achieve, is meaningful information on the operations of the marketing system as a communication process. Methods of measurement elude our grasp, although progress is beginning to be made with the aid of communication theory *(6)*.

Research in market structure and performance has been so overlaid with moralizing–the imperative of deciding whether performance is "satisfactory" or "unsatisfactory"–that the economist has become both judge and jury as well as prosecuting attorney. A return to first principles, i.e., a recognition of the role of the economist as an analyst without the necessity to judge, would rehabilitate a potentially highly useful area of research. It would make it possible to see relationships between the organization of the marketing system and the efficiency with which it operates.

The changing nature of the marketing system necessitates attack on two lines. Too big to be analyzed all at once, the marketing system–even for a single product group–must be partitioned in one dimension or another into manageable research bites. In many cases, we are interested in the chain-reaction nature of the system. In others, we are interested in the impacts on producers, marketers, or consumers of changes somewhere in the system. Often, we are interested in both. Even with modern high-speed computers, it is impossible to encompass all the subtleties of the marketing system in an econometric model. We can describe, analyze, or simulate the major relationships, but in so doing we must gloss over many of the fine points. For other problems, we take a small sector of the marketing system and analyze it in much greater detail.

The most useful statement of purpose in these analyses is that we are evaluating the performance of the marketing system. By performance, we mean the results of the system in carrying out its many functions. Used in this way, performance becomes almost synonymous with efficiency as defined earlier. Evaluation is to be interpreted in the sense of scientific measurement, not in the sense of judge and jury deciding what is good for society.

Fragmentation, Additivity, and Christmas Trees

The charge of fragmentation or nonadditivity of research in agricultural economics is nearly as venerable as the profession. In the late 1920's and early 1930's, the Social Science Research Council attempted to give direction to the research efforts of agricultural economists. A committee under the chairmanship of John D. Black prepared a series of reports outlining the field of research and suggesting related research projects in most of the subfields of agricultural economics. Since World War II, nearly every commentator on the state of the arts in marketing research has leveled the charge, the most recent being Shaffer *(9)*.

This is a serious charge and one which cannot be ignored with impunity much longer. Its causes are well known. The treatment is much more difficult and at best can be only partial.

Cures which depend on organization or administrative control are, to put it mildly, improbable. The benefits of atomistic competition among researchers are too well known and the habits too deeply ingrained in the research establishment for a reasonable man to expect change. It is tempting to say that the power of the purse could be used to achieve additive research. This is probably true but not very helpful, since the probability

of anybody achieving such a power and/or acquiring control of such a supply of funds is so remote that serious consideration is a waste of time.

The approach which seems to offer some hope of measurable progress on the road from fragmentation to additivity is that pioneered by the Social Science Research Council committee 40 years ago. A series of research programs in relevant areas of agricultural marketing could provide the basis for a marked increase in the additivity of research in agricultural marketing.

A research program is not a set of rigid rules set down to specify exactly what must be done, by what methods and by what persons on some fixed timetable. On the contrary, it is a set of guidelines indicating the relationships of the parts to the whole and to each other.

This approach to research organization has a long but rather thin history. It may be that the earliest efforts along these lines were those of the various consultants who attempted to outline appropriate areas of effort in 1922 for the newly organized Bureau of Agricultural Economics. The first published effort was that of the Social Science Research Council, previously referred to. Later enterprises included programs for research in milk marketing in New England *(8)*, poultry marketing in the Northeast *(5)*, and fruit and vegetable marketing in New England *(4)*.

Probably the most recent effort of this kind which has had visible results was the planning effort which went into the preparation of a national research program in egg pricing. Planned by a group of research workers in experiment stations and the U.S. Department of Agriculture and funded by Congress, this effort is currently concluding. It included a wide range of related research projects covering the many aspects of egg marketing which relate to the central pricing problem.

A research program can be what George Brandow has referred to as a "Christmas tree," the framework on which ornaments of research results can be hung to present ultimately a glorious and unified whole. Economists will, of course, have to be certain that it is a living Christmas tree, since the industries which they are studying are constantly growing and changing. One approach to the construction of such a Christmas tree would be a comprehensive review of what is known within a given field, i.e., a review of the results of existing research. If conducted with an appropriate framework in mind, it would indicate the gaps in knowledge and the relationships between research areas. For many areas, the most useful beginning for such an enterprise would be with the technical reports of the National Commission on Food Marketing, since they constitute the most recent attempt at a comprehensive statement of what is known about marketing specific food products. From such an enterprise, a stout-hearted man could proceed to develop a research program for an area such as dairy, livestock, poultry, or grain marketing which would indicate the unfilled gaps.

Such a research program—whether or not accompanied by an inventory of existing research results—would have a variety of uses. First, it would provide a "shopping list" for graduate students and researchers selecting a research project. In this case, it would furnish a more complete list of possible areas of research than any one individual would be likely to think of by himself. By indicating the relationships between an individual area of research and other parts of the marketing system, it would provide the basis for more additivity in research results. It would not make it impossible for a researcher to turn out a piece of work totally isolated from all other research and not capable of being used by others, but it would provide a nudge in the right direction. Second, it would provide the basis upon which groups of researchers could develop integrated studies of various parts of the system. Third, it would indicate data needs, including information which should be available on a continuing basis and that which can be obtained for individual projects. Such a research program should indicate a variety of uses of various kinds of data and should assist in determining what kinds are needed in what form. In the long run, it might lead to data exchanges or ultimately a data bank.

No research program or any other device will solve all the problems of research. However, such an approach can assist researchers in organizing their efforts more productively and moving more rapidly toward the goal of understanding the operations of the marketing system.

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Interim Period Asset Valuation: A Method for Making Investment Decisions

By Gordon E. Rodewald, Jr., and C. B. Baker

A COMMON METHOD of estimating an asset's potential contribution to the value of the firm has been based upon the discounted value of the stream of income expected to be generated by the asset. Variations of this have been proposed by several authors.[1] Most of these methods consider the investment from a net standpoint: initial investment minus the salvage value. Implicit in this type of calculation is either of two assumptions: (1) that the asset will be worth its stated salvage value at the end of the planning period or (2) that the asset will be used as long as implied in the calculations.

In certain situations and for some types of assets neither of these assumptions is valid. In these cases the rate of return cannot be meaningfully calculated. The objective of this paper is to provide a method for determining the economic feasibility of proposed investments and evaluating their economic consequences when the salvage value and the interval of use for the asset are unknown.

For many types of assets in most manufacturing processes both the salvage value and the use interval are known and the decision-makers have little difficulty in using net investment data to calculate the rate of return needed for proposed investments. For other types of business, particularly single proprietorships, the use interval is uncertain because of the operator's incomplete knowledge of his future willingness or ability to operate the firm for as long as implied by the specified planning period. In such instances, he needs to form estimates on the value of the asset at interim time intervals because of the possibility that he may cease to operate the firm and that the value of the asset may at that time be subject to test on the market.

The operator also needs to know at the time of his purchase decision what the future loss or profit to him will be if he ceases to operate the firm. In addition, if he has little or no control of product or factor prices, the annual return from the asset is subject to variation. It may then be more useful for him to know the required annual increment he must earn in order to recapture the investment, given the internal rate of interest for discounting. The opportunity rate of return is the rate of earnings expected from the best alternative investment. The method for valuing assets illustrated in this paper is relatively easy to employ. The method provides information for determining the annual increment which must be earned and the minimum expectation required on the value of the asset at successive time intervals following purchase. Data required for using the method are (1) the investment cost, (2) the opportunity rate of return, and (3) the expected earnings. The theoretical rationale for the method is well known and needs no explanation here.[2]

One assumption is critical in the use of the method. It is that the decision-maker has some rate which can be used to discount the time-flow units of income. Usually this rate is the opportunity rate of return and will approximate the opportunity cost of capital. An annual expected income flow is presumed to be available from previous budgetary or other economic analysis.

The relevant relationships are:

$$(1)\quad I = V_o = \sum_{t=1}^{t=k} \frac{E_o\,(Y_t)}{(1+r)^t} + \frac{E_o(M_k)}{(1+r)^k}$$

[1] See for example, Harold Bierman, Jr., and Seymour Smidt, The Capital Budgeting Decision, The Macmillan Co., New York, 2d ed., 1966; George A. Taylor, Managerial and Engineering Economy, D. Van Nostrand Co., Princeton, N.J., 1966; Anthony Merrett and Allen Sykes, Calculating the Rate of Return on Capital Projects, Jour. Indus. Econ., Vol. 9, No. 1, Nov. 1960; G. Terborgh, Dynamic equipment Policy, McGraw-Hill, New York, 1949. Each of these adequately states the value of using a system which considers the time value of either costs or returns or both.

[2] See Vernon Smith, The Theory of Investment and Production, Quarterly Jour. Econ., Vol. 73, No. 1, 1959, and Paul Samuelson, Foundation of Economic Analysis, Atheneum, New York, 1965, for complete treatment of fixed assets in the production process.

$$(2) \quad E_o'(Y) = \left[I - \frac{E_o(M_k)}{(1 + r)^k} \right] \frac{r}{1 - (1 + r)^{-k}}$$

$$(3) \quad E_o'(M_k) = \left[I - \frac{\sum_{t=1}^{t=k} E_o(Y_t)}{(1 + r)^t} \right] (1 + r)^k$$

where:

V_o = the value of the investment to the farm operator at t_o (the present);

I = the investment cost, used here as a substitute for the value V_o since V_o is unknown in some instances;

$E_o(Y_t)$ = the expectation held at t_o on the annual increment the asset will earn in year t;

$E_o(M_k)$ = the expectation held at t_o of the market value at t_k;

$E_o'(Y)$ = the minimum expectation held at t_o on the annual increment required to be earned between t_1 and t_k if $I = V_o$;

$E_o'(M_k)$ = the minimum expectation held at t_o on the value remaining in the asset at t_k which represents the value the decision-maker would have to receive for the asset at t_k to completely recover the investment cost;

r = the rate used to discount the annual increment;

t = unit of time; and

k = the number of years the asset is expected to be used.

Equation (1) says the value of the investment to the decision-maker at t_o (the present) is equal to the sum of the discounted expected annual earnings between t_1 and t_k (i.e., during the period the asset is expected to be used) plus the expected value remaining in the asset at t_k, again discounted back to the present. In practice, the expected value remaining in the asset $E_o(M_k)$ will be one of several values, depending upon the type of asset in question. It could be the salvage value at t_k if the asset were used up to the end of its economic life. It could also be the value the decision-maker expects the market to generate for the asset at t_k. For some types of assets such a value is either readily available or can be estimated easily. This would be the case for frequently traded machinery. For assets attached to real estate, such as drainage ditches, buildings, etc., $E_o(M_k)$ will be the expected addition to the value of the real estate to which it is attached.

However $E_o(M_k)$ is determined, it must be discounted to the present in order to be valid in determining the value of the investment $[V_o]$ for comparison with the investment cost [I]. The reason for discounting is to give the proper weight to this value in the decision process. To do otherwise would understate the required annual increment in equation (2) or undervalue the expected annual increment in equation (3).

In words, equation (2) states that the minimum annual increment required to retire the investment in k years $[E_o'(Y)]$ is equal to the quantity, investment cost [I] minus the discounted expected value remaining, $\frac{E_o(M_k)}{(1 + r)^k}$, times the capital recovery factor. If this value, $E_o'(Y)$, is earned each year between t_1 and t_k, the investment cost would be exactly recovered provided the expectation $E_o(M_k)$ held at t_o was realized at t_k. This is an important point.

It should be noted here that $E_o'(Y)$ includes both the return to capital and depreciation. Proof of this is offered in Smith's article[3] and will not be detailed here. Since depreciation and return to capital are both included, the decision-maker is assured that $E_o'(Y)$ is the current cost of using the capital item. Once $E_o'(Y)$ is calculated it can be compared to the expectation held at t_o on the annual increment expected to be earned, $[E_o(Y)]$, to determine whether the expected earnings suffice to make the investment economically feasible, given k and the discount rate.

Comparing $E_o'(Y)$ to $E_o(Y)$ is then an alternative method of deciding whether the investment is feasible within the decision-maker's constraints. One advantage in using this method to determine investment feasibility is that the decision-maker need not search for the rate of return. If the firm requires the asset to earn at a rate of 15 percent on investment, this could be used as the rate for discounting. Equation (2) would provide information for determining investment requirements in terms of earnings when the opportunity rate of return is constrained to a minimum level.

Equation (3) states that the minimum expected value remaining in the asset at t_k $[E_o'(M_k)]$ as seen by the decision-maker at t_o, is equal to the investment cost [I] minus the sum of the discounted annual returns between t_1 and t_k multiplied by the compound interest factor for year k. While equations (1) and (2) provide information and are of interest to the decision-maker, equation (3) is the equation which allows the decision-maker to see the

[3] Smith, op. cit., p. 65.

consequences of making the investment in terms of possible loss. At any time after t_1 there will be an asset value remaining which must be recovered if the investment cost is to be recovered. In this equation $E_o(Y_t)$, the expectation held at t_o on the annual increment the asset will generate, performs the function that $E_o'(Y)$, the required annual increment, does in equation (2). That is, it allows both depreciation and return to investment to be taken into consideration in determining the minimum expected value remaining at t_k. Because the time value of the earnings is explicitly taken into consideration in calculating $E_o'(M_k)$, the higher the rate used to discount $E_o(Y_t)$ the greater is the value remaining to be recovered. This is particularly important if t_k is greater than 4.

The value calculated for $E_o'(M_k)$ with equation (3) should not be confused with the value for $E_o(M_k)$, the expectation held at t_o of the market value at t_k, used in equations (1) and (2). All three values can be the same, though they need not be. As explained above, $E_o(M_k)$ may be known for some types of assets. Then equations (1) and (2) can be solved. In others, $E_o(M_k)$ may not be known and must be solved for in terms of minimum value remaining at t_k as seen by the decision-maker at t_o.

Illustration of the Decision Model

The method of valuing assets outlined above was used in a study concerning durable assets specialized in use for beef feeding. Equations (2) and (3) were used in valuing the beef feeding assets.[4] In equation (2), $E_o(M_k)$ was assumed to have a value of zero. An owner-operator is assumed already to be feeding cattle with a minimum of equipment. He wants to expand feeding capacity without increasing the use of labor. The proposed expansion is to come through an innovation requiring a large capital outlay. Farming is uncertain, but the farm operator needs to know prior to purchase of the capital assets what the assets must earn each year in order to recover the required investment. He must also know what the addition to the feeding enterprise will add to the value of the whole farm. However, market values are not readily available for the fixed assets he anticipates adding. As an alternative value he can calculate the minimum addition to whole farm value if the investment cost is to be completely recovered at any

[4] These results were taken from G. E. Rodewald, Jr., Economic Conditions Necessary for the Installation of Fixed Assets on Cattle Feeding Systems, unpublished Ph.D. thesis, Univ. Ill., March 1968.

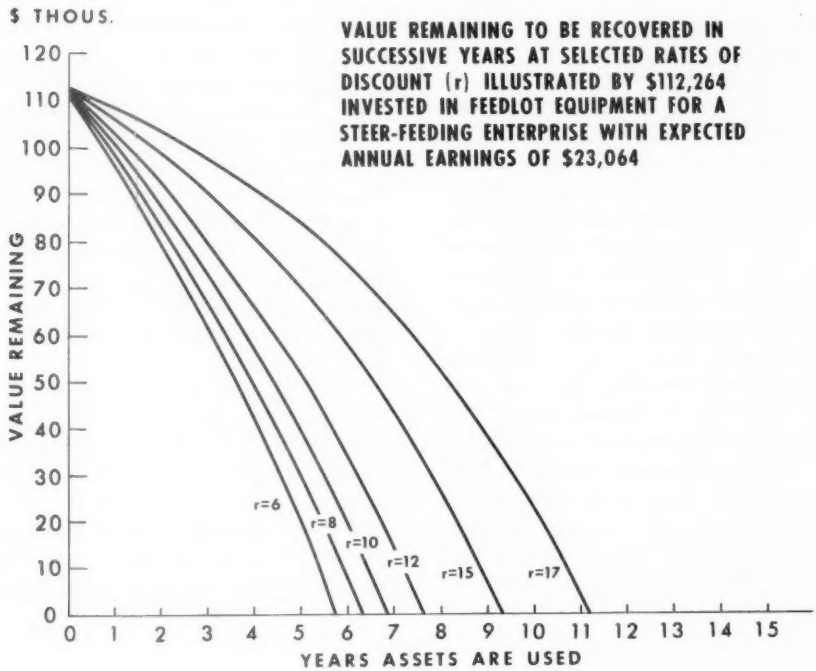

Figure 1

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of a succession of future dates. This will be $E_o'(M_k)$ as defined by equation (3) above.

Figure 1 illustrates the effect at the end of successive years of use, of using a high rate [r] to discount expected annual earnings on the minimum value remaining (i.e., the minimum required addition to whole farm value, $E_o(M_k)$). The investment cost for this illustration was determined to be $112,264, which equips the feedlot for 1,151 head of steer calves 330 days each year. The expected annual increment $[E_o(Y)]$ was determined to be $23,064. The investment cost in this case is the cost of additional equipment. The estimate of $112,264 was arrived at by determining the new cost for the equipment required to feed 1,151 steer calves per year. Budgets were constructed to determine the expected annual increment of $23,064. From figure 1 it is possible to see that the minimum required value remaining (or more appropriately in this case, minimum addition to farm value) does not vary extremely for short time periods (k is relatively small) and for relatively small values of r. However, for large values of either k or r, the variation in the required value to be recovered from the market becomes increasingly larger.

For example, if k = 6, given $E_o(Y)$ = $23,064, the minimum required value remaining is zero for all values of r up to r = 6. This means the investment cost will be completely recovered provided the expectations with respect to expected annual income $E_o(Y)$ are realized. For values of r greater than r = 6, the minimum required value remaining, $[E_o'(M_k)]$ takes on a positive value, the magnitude of which increases as the discount rate gets larger. Therefore, when r = 15, $E_o'(M_k)$ = $58,000 and with r = 17, $E_o'(M_k)$ increases to approximately $75,000. Since $E_o'(M_k)$ is the minimum value that must be added to the value of the whole farm to recover the investment, the owner-operator must be concerned about the magnitude of this addition. As was demonstrated above, the addition increases as r becomes larger. Knowing this and the magnitude provides a basis for evaluating the investment by using a rate for discounting that reflects the opportunity cost of the investment.

We mentioned earlier that the single-proprietor type of business organization was particularly susceptible to uncertainty with respect to investments since when the owner leaves the firm it is likely to be transferred to other ownership. In cases of transfer the expected asset value or addition to the value of the whole farm based on the expectation $E_o(M_k)$ will be subject to test on the market. Using high rates for discounting expected annual earnings could overestimate the additional value the market is willing to generate for the asset. The result would be a loss to the owner-operator. Conversely, using a low rate could underestimate the value the market is willing to generate, resulting in a gain to the owner-operator. The principal advantage of using equation (3) would be to see the required addition to the whole farm value at any point in time, thereby providing an additional piece of information at the time the investment is contemplated.

Application of equation (2) is straightforward. Given the investment cost (I), the years the investment is expected to be used (k), the discount rate (r), and the assumption concerning $[E_o(M_k)]$, $E_o(Y)$, the required annual increment, is found by using the capital recovery factor. As would be expected, the closer t_k is to t_o, at any r, the larger is $E_o'(Y)$. Figure 2 illustrates the effect of both k and r on the required annual increment $[E_o'(Y)]$. At a discount rate such as 6 percent the decision-maker would be required to use the asset for at least 6 years in order to completely recover the investment cost if he assumed $E_o(M_k)$ were zero. If a value is known or can be assumed for $E_o(M_k)$ all of the curves in figure 2 would be moved downward, indicating a smaller required value to be earned.

Comparing the calculated required annual earnings $[E_o'(Y)]$ with the budgeted annual earnings $[E_o(Y)]$ enables the owner-operator to determine the amount of leeway he has in the amount the investment must earn each year. For example, if $E_o(Y)$ is $23,064 (as shown by the horizontal dash line in figure 2) and k is 6 with r = 6, $E_o'(Y)$ is determined to be $22,500. On this basis the assumptions underlying the expected income $[E_o(Y)]$ must be very sound if a loss is to be avoided at t_k (at the end of the 6-year period). On the other hand, if k = 10, r = 6 with $E_o(Y)$ = $23,064, $E_o'(Y)$ need only be $15,000 which allows income to decline 35 percent without jeopardizing the expectation held for the addition to whole firm value (in this case $E_o(M_k) = 0$) at t_o.

Using equation (2) and $E_o(Y)$ together with equation (3) will improve the decision-making process and enable the owner-operator to better judge whether the investment is economically feasible, given the uncertainty of his situation. Not only will he be able to determine the size of the minimum required annual increment to be earned, but he can also make a comparison to determine latitude between the expectation held on annual earnings and the required annual earnings.

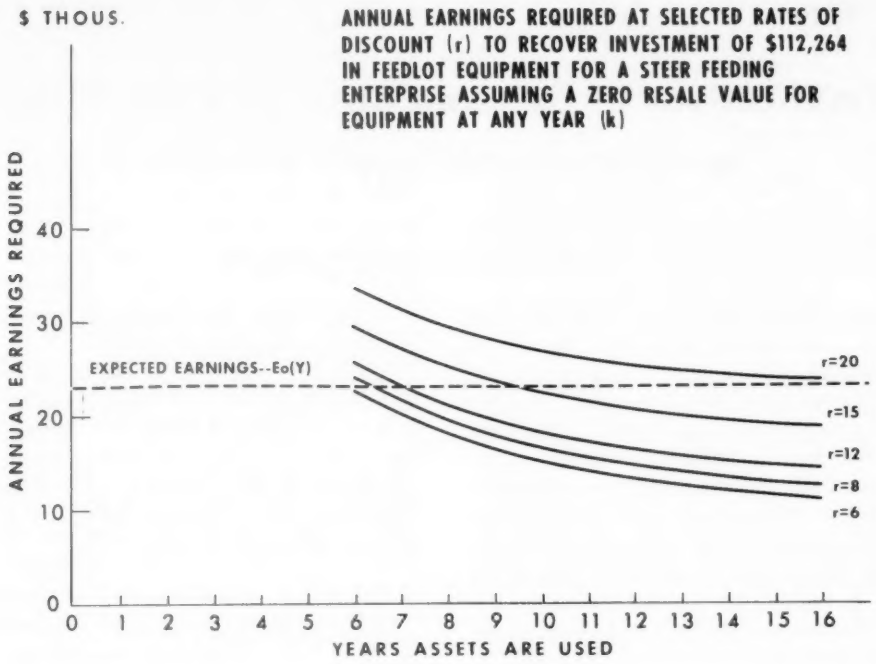
$ THOUS.
ANNUAL EARNINGS REQUIRED AT SELECTED RATES OF DISCOUNT (r) TO RECOVER INVESTMENT OF $112,264 IN FEEDLOT EQUIPMENT FOR A STEER FEEDING ENTERPRISE ASSUMING A ZERO RESALE VALUE FOR EQUIPMENT AT ANY YEAR (k)
ANNUAL EARNINGS REQUIRED
40
30
20
10
0
EXPECTED EARNINGS--Eo(Y)
r=20
r=15
r=12
r=8
r=6
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
YEARS ASSETS ARE USED

Figure 2

Implications of Exit and Entry of Farm Firms in Agricultural Supply Analysis

By G. J. Conneman and D. H. Harrington

MUCH HAS BEEN WRITTEN in recent years concerning the exit of farms from agricultural production, and the pattern of growth of farm firms. The most overworked cliche is that there are "fewer but larger farms." As a generalization this is true. But there are actually two dynamic features to changes in the number of farm firms: exit and entry. One could brand this dichotomy as self-evident if the concept were unimportant from a research viewpoint. Exit and entry, if they occur, certainly affect the net changes in the number of farms and changes in total production. The change in the number of farms has a major effect on the results from the application of two widely used concepts in agricultural supply analysis studies: the representative farm concept and the Markov process concept. Too often agricultural supply analysis studies have not taken sufficient account of the dynamic nature of changes in supply as caused by both exit and entry of firms.

Purpose

The purpose of this paper is to review the phenomena of exit and entry, to examine the influence that exit and entry of firms have on the results obtained by using the Markov process and representative farm technique, and to suggest one method for obtaining appropriate data on exit and entry that would result in improved estimates of supply response.

Some Examples From Agricultural Economics Literature

Neither economic theory nor applied economic studies in agriculture adequately consider the subject of exit and entry of firms. Economic theory proclaims that an increase in demand for a product causes a chain of reactions which leads to profits, which subsequently leads to entry of firms. A decrease in demand is purported to have the opposite effect—an exit of firms from the industry. Both phenomena occur until long-run equilibrium is reestablished *(6)*.[1]

Many early studies in agriculture did not attempt to measure entry and exit when describing changes or making projections of change of the internal structure or their effect on aggregate production. Perhaps the earliest recognition of the problem of entry in agriculture was reported by Wilcox *(8)* when he pointed to an example in a hog study by O. V. Wells in 1933:

> The hopelessness of using a statistically determined modal group of farms as representative of the behavior of the entire group is suggested by a study by Wells. In studying farmers' response to price in hog production he found that 80 percent of the expected increase in farrowings in 1927 over 1926 was accounted for by men who had no sows that farrowed in 1926. The December pig survey in 1926 indicated that farrowings in 1927 would total 5.6 percent larger than in 1926. At the other extreme producers with more than 11 sows on an average expected to decrease their farrowings by a small percentage. Size of sow herd was an important factor associated with direction and amount of change in hog production on the individual farms from 1926 to 1927. The modal group of farms with respect to the size of their herd could not reflect these differences.

But beyond this example of Wells, scant attention has been given in the literature to entry and exit in agriculture. Kottke devoted an entire bulletin to exit and growth pattern of dairy farms in Connecticut but scarcely mentioned entry *(5)*. Researchers, although aware of the effects of both the exit and entry of farm firms, have not generally had good data on the number of entry farms and exit farms. Many data are not broken down by entry and exit farms, so most researchers have been forced to use the net change in farm numbers.

[1] Italic numbers in parentheses refer to items in the References, p. 44.

Empirical Investigation

Data from the Cornell Producer Panel of dairy farms from 1960 to 1964 are used to shed light on exit and entry *(2)*. A producer panel is a group of farmers questioned and revisited over a period of time to determine adjustments taking place. The panel consists of a random sample of small area segments which contain a 2.5 percent sample of the dairy farms in the New York milkshed area. This has been useful in analyzing the complex of factors associated with change in milk production on dairy farms.[2] Information was obtained from the panel not only on continuous producers but also on farms that went out of production (exit) and those that began production (entry). Thus, the full spectrum of changes in milk output was included.

An exit farm was a farm that was producing and delivering milk to market in June 1960 and that withdrew from milk production sometime between June 1960 and June 1964 and was not delivering milk in June 1964. A farm consolidated with another by rental or purchase was considered an exit farm, and the farm with which it was combined was considered to have expanded its resource base.

An entry farm was a farm on which no milk was produced in June 1960 but which came into milk production between June 1960 and June 1964 and was producing milk in June 1964.

An active or continuous farm was a farm unit on which milk was produced continuously during 1960-64. A farm on which there was a change of operator, but with an interruption of 3 months or less in milk production, was considered as having been in continuous production during the entire period.

The total amount of milk produced on a sample of farms in the New York milkshed area between the 1960 and 1964 production periods increased from 400 to 430 million pounds (table 1). The increase in milk from farms that came into production was not enough to offset the reduction in milk produced on farms that went out of production. Continuous farms increased total output by 59 million pounds. Entry farms added 9 million pounds to total milk production. Exit farms accounted for a decrease of nearly 38 million pounds. Milk production increased 17.0 percent on farms in continuous production (those active during the entire period). Considering both continuous and exit farms, total production increased 5.3 percent. However, considering continuous, exit and entry farms, milk output on all farms included in the panel increased by 7.5 percent.

Table 1.–Change in milk output by continuity of production on farm, 1,658 dairy farms, New York-New Jersey milkshed area, 1960 to 1964

Farms classed by continuity of production	Number of farms	Milk production		Change in milk production	
		1960	1964		
	Farms	*Mil. lb.*	*Mil. lb.*	*Mil. lb.*	*Percent*
Continuous . .	1,265	346	405	+59	+17.0
Exit	335	52	14	-38	–
Entry	58	2	11	+9	–
All farms . .	1,658	400	430	+30	+7.5

Milk production on the entry farms in 1964 accounted for 2.6 percent of total production in that year. This illustrates the importance of both exit and entry farms in analyzing changes in milk production over time. Failure to include both entries and exits gives an inaccurate estimate of changes in total production.

Special characteristics of the Northeast dairy area may make entry and exit more of a research problem there than in other areas of the country. Dairy farming is less closely tied to land resources than many other types of agriculture. Urban penetration and idle cropland are both significant sources of change in the land base of the Northeast dairy area. Thus, good aggregate estimates of resource use are more difficult to obtain in the Northeast than may be true elsewhere.

Entry, Exit, and the Representative Farm Concept

Basically, the representative farm approach to supply analysis consists of selecting or constructing a farm to represent each distinct situation in an area or region, deriving supply functions for these farms, and aggregating the individual supply functions to provide an estimate of the aggregate supply for the area or region. The usual method of constructing a representative farm by the average resource method is to divide the farms into categories or relatively homogeneous groups according to specified classification or sort factors. The factors used are those believed to be most closely related to production response. The most frequently used factors for classifying dairy farms into groups have been such conventional resources as land, labor, number of cows, stall capacity of barn, and capital. In this aggregation of

[2] The New York milkshed area covers parts of six States: New York, New Jersey, Pennsylvania, Maryland, Delaware, and Vermont.

individual supply functions, the weighting factor is based on the original number of farms in each group in the base period.

Exit and entry have important implications for the changing resource base in representative farm studies. This is illustrated for the Eastern Plateau region of New York in table 2. Representative farm groups were set up for the Eastern Plateau region with crop (tillable) acres and stall capacity as sort factors. Overall, the number of sample farms producing milk in this region decreased from 174 to 137 between 1960 and 1964. This represented a net decrease of 37 farms, or 21 percent. The net change was the result of 47 sample farms going out of production and 10 farms coming into production. If the sample had not allowed for entry, the rate of decline in the number of farms would have been estimated at 27 percent, resulting in an error of 6 percentage points.

The rate of exit and entry, and thus the net changes in the number of farms, varied by representative farm groups. The net rate of change varied from zero (Medium-Extensive group) to a decline of 47 percent (Very Small group). Furthermore, the proportion of total farms that each group made up varied according to whether the original number of farms was considered, the number of farms including only exits, or the number taking both exit and entry into account. For example, the Very Small group represented 8.6 percent of the total number of farms in 1960, but only 5.8 percent in 1964. Thus, differential rates of exit and entry between groups reduce the accuracy of the approach of ex post facto adjustment of representative farm groups by an aggregate rate of change. With producer panel data one can improve on the ex post facto method of adjustment.

Entry, Exit, and the Markov Process Concept

The Markov process is a technique applicable to studying and projecting changes in the number and size distribution of certain variables over time. It is a stochastic process in which the probability of the outcome of the next event or trial depends only on the state of the system prior to the event *(4)*. It is assumed that a population can be classified into "states" or "groups." Knowledge of the state of the system at any point in time and the probabilities associated with change provide a basis for projecting the outcome of one or more future events if the basic Markov conditions hold. The process states the probabilities of change from one state to another through time. This process of change is described by a matrix of transition probabilities. Thus, it is a method of describing and analyzing the cross currents of change over time—exit, entry, growth, decline—in a systematic way. It provides a method of

Table 2.—Change in number of dairy farms classified by resource group, Eastern Plateau region, New York State, 1960 to 1964

Description	Land and housing capacity group		Number of farms in 1960	Changes between 1960 and 1964		Number of farms in 1964	Net change 1960-64	Proportion of total number of farms in:		
	Crop acres[a]	Stalls[b]		Exit	Entry			1960	1964 considering only exit	1964 considering both exit and entry
							Percent	*Percent of total*		
Very small	1 - 32	1 - 24	15	8	1	8	-47	8.6	5.6	5.8
Very small–intensive	1 - 32	25 - 39	8	1	0	7	-12	4.6	5.6	5.1
Small	33 - 66	1 - 24	23	11	1	13	-43	13.2	9.4	9.5
Small–intensive	33 - 66	25 - 39	27	8	2	21	-22	15.5	15.0	15.3
Small–very intensive	33 - 66	40+	6	2	0	4	-33	3.5	3.1	2.9
Small–extensive	67 -134	1 - 24	10	1	0	9	-10	5.7	7.1	6.6
Medium	67 -134	25 - 39	30	8	2	24	-20	17.2	17.3	17.5
Medium–intensive	67 -134	40+	32	3	0	29	- 9	18.4	22.8	21.2
Medium–extensive	135+	25 - 39	6	2	2	6	0	3.5	3.1	4.4
Large	135+	40+	17	3	2	16	- 6	9.8	11.0	11.7
Total	–	–	174	47	10	137	-21	100.0	100.0	100.0

[a] Number of crop acres operated (owned plus rented).
[b] Number of stalls refers to the number of stanchions or ties for mature cows in conventional barns, and the cow capacity of loose or free stall barns.

projecting this pattern of change into the future to arrive at a projection of numbers as well as distributions in the future.

In most of the research studies using this technique the general procedure has been to observe some pattern of change over time, to determine the transition probabilities during this period of time, and on the basis of this past pattern of change, to project future change *(1, 3, 5, 7)*. The key assumption in the use of the Markov process is that the pattern of shift from one category to another exhibited in the past will continue into the future—constant transition probabilities—and that past changes are an important determinant of future changes.

The importance of entry and exit to the crosscurrents of change in the number of dairy farms in New York State is shown in table 3. This simplified and compressed[3] transition matrix illustrates the exit and entry problems on dairy farms. The first column shows the herd size classes and the second column the number of herds in each size class in 1960. The remaining columns show how the herds in each size class in 1960 were distributed by size class in 1964. For example, there were 36,100 farms with 1 to 49 cows in 1960. Of this number, 8,480 had gone out of business by 1964, 25, 620 stayed in the same category, 1,920 increased to 50 to 99 cows, and 80 increased to 100 or more cows. There were 1,600 entries into dairying between 1960 and 1964 from farms that had been idle at the beginning of the period. Of this number, 1,520 had 1 to 49 cows, and 80 had 50 to 99 cows (table 3, first row). The *last row* in the table indicates the number of farms in each size class in 1964.

Table 3.–Change in number of dairy farms in New York State, by size of herd, 1960 to 1964

Size class in 1960 (number of cows)	Number of farms in 1960	Size class in 1964 (number of cows)			
		0	1-49	50-99	100+
		Number of farms			
0	Entry farms →		1,520	80	0
1-49	36,100	8,480	25,620	1,920	80
50-99	3,700	240	780	2,460	220
100+	380	0	0	80	300
		Exit farms ↓			
Total farms (1960).	40,180	8,720	27,920	4,540	600
					Total farms (1964)=33,060

A substantial number of farms were in the same size category in 1964 as in 1960. In the 50 to 99 size category, 2,460 out of 3,700 farms remained in the same category in 1964 as in 1960. The number of farms remaining in the same category during the whole period is shown along the diagonal in the table. Small farms (1 to 49 cows) went out of dairying at a faster rate than large farms. Of the 36,100 original farms having 1 to 49 cows, 8,480 or 23.5 percent were no longer in dairying in 1964.

Projections based on the Markov process techniques are influenced by both the initial distribution at the base date and by the transition probabilities. In table 3, 8,720 out of 40,180 farms in production in 1960 had gone out of production by 1964. This is a *gross* rate of decline of 21.7 percent. In the same time period, 1,600 farms or 4.0 percent had come into production, resulting in a *net* rate of decline of 17.7 percent (7,120 net exit farms out of 40,180 farms). Had the Cornell Producer Panel ignored entry of farms, the estimated rate of decline would have been the gross rate. Furthermore, the number and distribution of farms between size groups in 1964 would have been 4.8 percent lower (31,460 estimated farms vs. 33,060 actual farms). Therefore, to fail to take account of entry farms would have greatly biased both the 1964 distribution and the transition probabilities. The effects of such biases are cumulative in the Markov chain projection technique; thus, the errors rapidly build to unmanageable proportions.[4]

Summary and Implications

Data from the Cornell Producer Panel of dairy farms in the New York milkshed area indicate the importance of exit and entry of dairy farms during 1960-64. Nearly 3 percent of the milk produced in 1964 came from farms that entered production after 1960. The rate of exit and entry varied by resource group of the type commonly used in representative farm studies. Furthermore, in New York State, expansion of the 2.5 percent sample to approximate the State total and analysis in a Markov matrix context showed that nearly 22 percent of the farms in 1960 exited and that nearly 5 percent of

[3] In the analysis of changes in the Cornell Producer Panel, size class intervals of 5 to 10 cows were used.

[4] The results when using Markov processes are greatly influenced by different assumptions as to exit and entry of firms. See: B. F. Stanton and L. Kettunen, Potential Entrants and Projections of Markov Process Analysis, Jour. Farm Econ., vol. 49, Aug. 1967, p. 633-642.

the farms in dairy production in 1964 had entered during the intervening period.

Exits and entries of this magnitude, and their differences by size and resource groups have important implications for both Markov process analysis and for the changing resource base in representative farm studies. The data on exit and entry of dairy farms in the New York milkshed area and New York State point to the need for a method to explicitly handle exit and entry in the design for collection and analysis of data. In data collection, a producer panel is one such technique. The distinguishing feature of the research design of the Cornell Producer Panel is that "farms" (producing units) rather than "farmers" were the sampling units. The panel was based on an area sample. All dairy farms and all other nondairy farms that fell within the segment area were enumerated. Area segments made it possible for farms which were not producing milk at the outset to enter the sample later. Segments also allowed the measurement of the effects of farm consolidation.

Secondary sources of data frequently employ panel designs in which the same units are included in repeated samplings. These sources can furnish estimates of entry and exit provided the individual detail is available in addition to the aggregate data.

Estimates of supply response could be improved if accurate data were available on the numbers of farms that enter the industry, leave the industry, and continue in the industry. The producer panel is a good method for obtaining these data.

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Variables Related to Farm Real Estate Values in Minnesota Counties

By Anne E. Hammill

FARM REAL ESTATE values are influenced by a number of variables, some of which are directly related to the farm while others are related to the farm community and to factors in the nonfarm community. These influences may be grouped into three categories: Soil quality, local development, and location.

The purposes of this paper are to explain the selection and construction of variables used in multiple regressions designed to explain 1959 and 1964 farm real estate values in Minnesota counties, and to present the results of the regression analyses.

Variables Selected

Soil quality refers to the characteristics of soils that influence productivity. They may be represented in several ways: Soil types, land capability classes, or indexes incorporating various components that indicate effects of soil quality. Limitations associated with soil types or land capability classes as measures of soil quality include the following: Soils vary widely in quality even within a given type or capability classification; therefore, detailed knowledge of soils in an area is essential for accurate identification. The information represented by soil maps or capability classes is often too gross to adequately represent soil quality on a given farm. The comparison of one soil type or classification with another is hazardous since management practices may have altered for better or worse the initial quality of the soil. In using soil types or land capabilities, such conditions as temperature and rainfall are not considered.

For this study, a crop production value index was constructed in an effort to avoid the shortcomings associated with using soil types or land capabilities and hopefully to achieve closer approximation to soil quality as it influences productivity. It is recognized that a crop production value index may have inherent weaknesses due to the degree of accuracy and dependability of the data included.

The crop production value index was constructed from data on acres, production, and prices for those crops that were grown on 80 percent or more of a county's acreage in 1959 and 1964.[1] Production for each crop was multiplied by average prices for the respective years to give a value figure. Values for each crop were added and the total was divided by the total crop acres. This resulted in the average value of crops per acre per county. This crop production value index was expected to represent the cropping patterns that would yield the highest profits for a given county. Thus management considerations are included implicitly as are temperature and weather conditions that could influence yields. Also included implicitly in the crop production value index are the influences of various farm programs as they affect the amounts and kinds of crops grown. No attempt was made to include direct Government payments associated with farm programs.

Cropland as a percentage of all land in farms was entered as a second soil quality variable to ascertain the influences on farm real estate values of the amounts of farmland suitable for crops as opposed to farmland in forests or other uses.

Local growth was defined as local economic activity that would indicate purchasing power, local pressures for land, and population densities. The variable selected to represent this concept in the 1959 equation was percentage of the population consisting of rural nonfarm and urban. This variable was expected to indicate concentrations of nonfarm persons with the largest percentage representative of the most business development, greatest pressures for rural land, and highest incomes.

[1] Source of data was Minnesota Agricultural Statistics (Rpt. of State-Federal Crop and Livestock Reptg. Serv., Minn. Dept. Agr., cooperating with USDA, Statis. Rptg. Serv., St. Paul, Minn., 1960 and 1965.).

Location, defined as distance from major cities, could be represented in several ways: Actual miles, zones of various distances, or travel time. However, none of these separate measures takes into account the influence of the size of a city as well as its distance. For this study, the distance was measured (provided it was 200 miles or less) from the center of a county to a standard metropolitan statistical area (SMSA). This distance was divided into the population of the SMSA. When more than one SMSA fell within 200 miles of a county, the ratios were added to give a total effect. SMSA's that influenced Minnesota counties were the Twin Cities; the Fargo-Moorhead area along the Minnesota-North Dakota border; the Duluth-Superior area on the Minnesota-Wisconsin border; Sioux Falls in South Dakota; Sioux City, Waterloo, and Dubuque in Iowa; and Madison and Green Bay in Wisconsin.

The dependent variable for this study was the county average value of farm real estate per acre expressed in dollars.[2]

Hypotheses Tested

If farm real estate values are influenced by location relative to major cities, one would expect high values to occur near the Twin Cities Metropolitan Area (TCMA) and other major cities, with progressively lower values occurring as one moves away from the TCMA and other cities. And if the size of the city is important, one would expect higher values near the TCMA than near a smaller city. If soil quality and local economic development have an influence on farm real estate values, one would expect high values to be associated with better soil and greater growth both near and away from major cities.

To evaluate the relationships among farm real estate values, location, local growth, and soil quality in Minnesota, all counties in which the rural farm population accounted for 25 percent or more of the total population were studied. Counties excluded by this criterion in the 1959 equation were Anoka, Beltrami, Blue Earth, Carlton, Clay, Cook, Crow Wing, Dakota, Hennepin, Itasca, Koochiching, Lake, Mower, Olmstead, Ramsey, Rice, Sherburne, St. Louis, Washington, and Winona. These are chiefly counties that have major urban centers or are in nonagricultural areas in the northern part of the State (see map 1).

In order to test the hypotheses suggested, a multiple linear regression was run using the following model for 1959 data:

$$Y = a + bX_1 + bX_2 + bX_3 + bX_4 + e.$$

In this model, Y = farm real estate values per acre, X_1 = population/distance, X_2 = crop production value index, X_3 = percent cropland, X_4 = percent rural nonfarm plus urban, and e = error. Results of the regression are summarized in table 1.

Signs of the coefficients are positive, as was expected. The most important variable affecting county farm real estate values was the percentage of farmland in crops. The population/distance variable was next most important, and the crop production value index was third. The local development variable was of little importance in explaining farm real estate values.

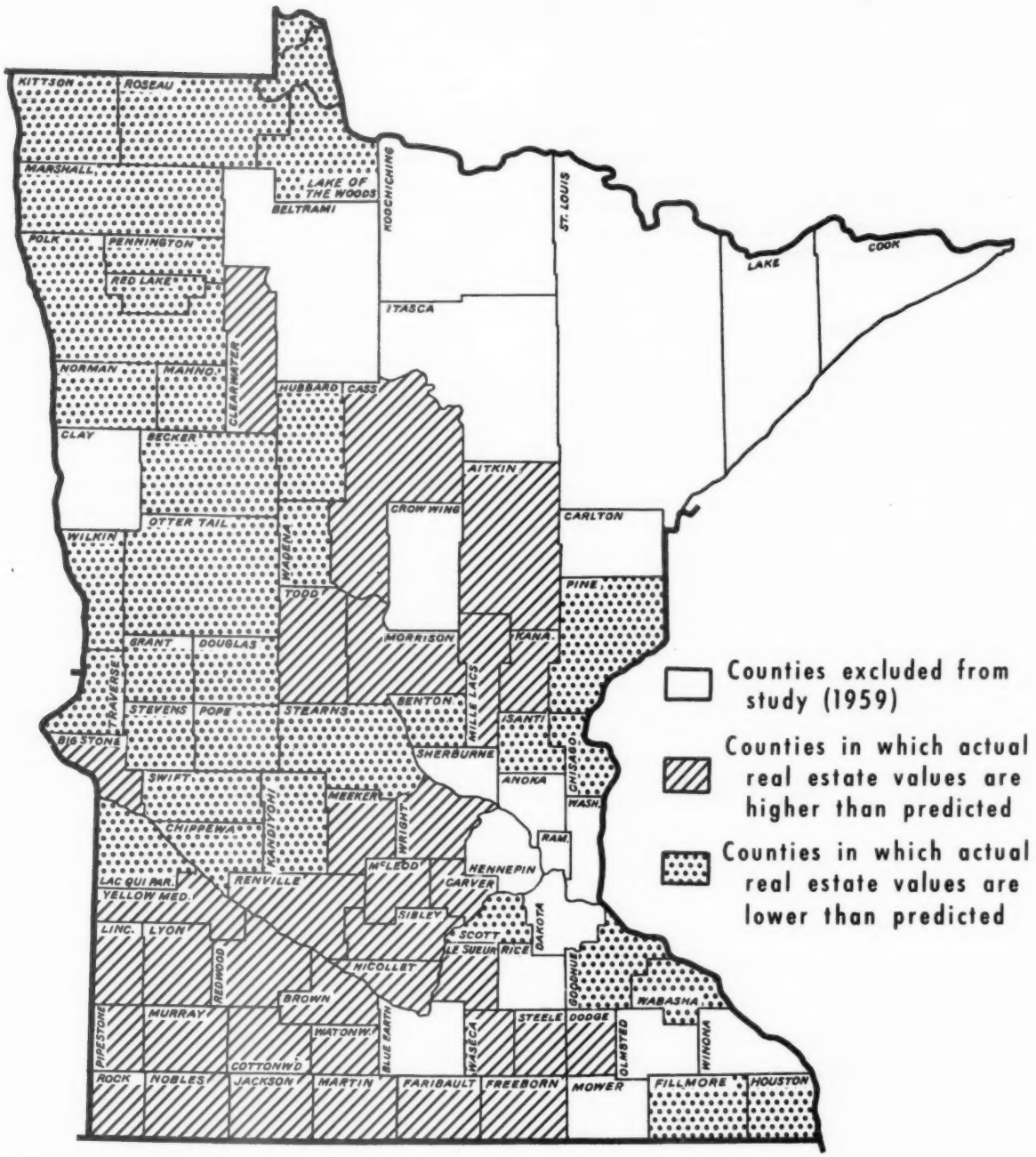
[2] Values for 1959 were obtained from Farm Real Estate Values in the United States by Counties, 1950-1959, edited by Thomas J. Pressly and William H. Scofield (Univ. Wash. Press, Seattle, 1965).

Table 1.–Results of regression relating four variables to farm real estate values in Minnesota counties, 1959

Variables	Regression coefficient	Standard error	t	Partial correlation coefficient
Population/distance	.0227	.0051	4.48**	.49
Crop production value index	.0150	.0073	2.06*	.25
Percent cropland.	2.7726	.3504	7.91**	.71
Percent rural nonfarm, + urban	.0077	.0072	1.08	.13

R^2 = .71

** Within .05 limit.
* Within .01 limit.



Map 1.–Minnesota counties included in study.

The multiple R_2 at .71 is respectable considering the few variables used in the equation. It is more noteworthy when it is recognized that in a previous equation, with all of the same variables except percent rural nonfarm and urban, the R_2 was .70. Hence this local development variable is contributing almost nothing to the explanation of the variance in this study.[3]

Simple correlations among variables are positive except for two relationships: (1) population/distance vs. percent cropland, and (2) percent rural nonfarm and urban vs. percent cropland. These negative correlations are so small as to be unimportant. The highest relationships are percent cropland and the crop production value index, both of which are correlated with farm real estate values. These relationships are shown in table 2.

Analysis of residuals

Residuals were plotted on map 1. The areas in which the actual real estate values were higher than predicted are represented by positive figures. These counties are located in the southwestern and north central areas of the State.

The location and land quality variables explained approximately 70 percent of the differences in farm real estate values among Minnesota counties. The remaining 30 percent undoubtedly is attributable to the value of farm buildings and to other local factors that differ from one part of the State to another.

[3] Coefficients and standard errors for the 3-variable equation are: Population/distance .0242 (.0049); Crop index .0160 (.0072); Percent cropland 2.7349 (.3492).

In an attempt to identify some of these local factors several variables were plotted against the residuals. These variables included ratio of primary to secondary industry employment, total nonagricultural employment, population of the largest city in a county, population per square mile, percent unemployed, number who worked 48 to 52 weeks a year, taxable payrolls, median family income, and population per square mile. None of these variables was correlated with the residuals to an extent that would suggest a higher explanatory value than was recorded.

Minnesota counties vary widely with respect to types of farms, soils, climate, local development, and other factors. Located in the southeastern counties are several important medium-sized and small cities. Few comparable cities exist elsewhere in the State.

In the north central section of the State, near the Twin Cities, farmland is purchased for recreational purposes and summer homes. In acres adjacent to major cities, investors influence real estate values.

The southwestern and Red River valley counties are suited for commercial agriculture, but quite different crops are grown in each area. The southeastern and east central counties support dairying. Throughout the agricultural areas of the State, purchases of land by farmers for expansion purposes have undoubtedly influenced farm real estate values.

Hence, in view of the many differences throughout the State, local factors must be considered in explaining the remaining 30 percent of the differences in farm real estate values not accounted for by the variables studied. Nevertheless, a relatively close approximation of farm real estate values in Minnesota can be made by using the coefficients for the location and land quality variables

Table 2.–Simple correlations among variables in Minnesota farm real estate study, 1959

Variable	Population/ distance	Crop production value index	Percent cropland	Percent rural non-farm + urban	Real estate values
Population/distance	1.00	.480	-.032	.369	.473
Crop production value index . .		1.00	.381	.254	.614
Percent cropland			1.00	-.054	.662
Percent rural nonfarm + urban . .				1.00	.232
Real estate values					1.00

and taking into account the location of the property within the State. This relatively simple model indicates the importance of natural resource variables in influencing farm real estate values.[4]

1964 Equation

To test whether or not the three variables–population/distance, crop production value index, and percent cropland–would explain 1964 real estate values as well as they did 1959 values, a second equation was run.

For the 1964 model, the population/distance variable remained the same since the most recent population figures for SMSA's are the 1960 figures. The remaining variables were reconstructed or obtained to reflect 1964 values. Counties that were excluded because they did not meet the criterion for rural farm population in addition to those eliminated in the 1959 model were Hubbard. Kandiyohi, Lake of the Woods, Stearns, Martin, Nicollet, Scott, and Freeborn.

Results of the equation indicate that the 1964 model with an R^2 of .898 explains more of the variation in farm real estate values than did the 1959 model. Coefficients for the variables are almost comparable for the two models (see table 3).

Simple correlations between the population/distance variable and farm real estate values and between the crop production value index and farm real estate values were higher in 1964 than in 1959 (see table 4).

The higher R^2 in 1964 was hypothesized to be a result, in part, of the reduction in number of counties included in the analysis. The counties studied were thought to be similar in characteristics and hence subject to the higher degree of explanation provided by the independent variables. To check the validity of this hypothesis, a regression was run on the 1959 data using the same variables and the same counties as in the 1964 run. The resulting R^2 at .69 indicates that the removal of the eight counties in the 1964 equation probably had little influence on increasing the R^2.

It is evident, however, that between 1959 and 1964, the importance of the population/distance variable and the crop production value index relative to real estate values increased substantially as indicated by the respective partial correlation coefficients. The regression coefficient for the crop production value index increased slightly in 1964 and became significant at the .01 level.

Summary and Conclusions

Four variables representing location, soil quality, and local development were selected to explain 1959 county farm real estate values in Minnesota and three variables representing location and land quality were used for 1964 data. The construction of each variable was described and results of linear multiple regressions were presented.

This was a cross-section study in which no attempt was made to consider changes in prices, technology, or

[4] Several research studies of factors influencing farm real estate values have been reported in which complex econometric models were used in conjunction with numerous variables. Among these studies are: John E. Reynolds, An Econometric Investigation of Farmland Values in the United States (Unpublished Ph.D. thesis, Agr. and Home Econ. Expt. Sta., Iowa State Univ. Sci. and Technol., Ames, 1966); G. Edward Schuh and Wesley C. Scharlack, Quantitative Analysis of Some Farm and Nonfarm Determinants of Agricultural Land Values–Impact of Economic Development (Purdue Univ. Agr. Expt. Sta. Res. Bul. 821, Nov. 1966); Luther G. Tweeten and Ted R. Nelson, Sources and Repercussions of Changing U.S. Farm Real Estate Values (Okla. Agr. Expt. Sta. Tech. Bul. T-120, 1966).

Table 3–Results of regression relating three variables to farm real estate values in Minnesota, 1964

Variable	Regression coefficient	Standard error	t	Partial correlation coefficient
Population/distance	.0263	.0035	7.52*	.71
Crop production value index	.0200	.0029	6.91*	.68
Percent cropland	2.2612	.2530	8.94*	.77
R^2 - .898		*-.01		

Table 4—Simple correlations among variables explaining Minnesota farm real estate values, 1964

Variable	Population/ distance	Crop production value index	Percent cropland	Farm real estate values
Population/distance	1.00	.461	-.145	.537
Crop production value index . .		1.00	.475	.851
Percent cropland			1.00	.636
Farm real estate values				1.00

other factors that would influence farm real estate values over time.

Results indicate that three relatively simple variables explain 70 percent of the variation in farm real estate values in 1959 and 89 percent in 1964. Because of the wide differences in local characteristics throughout the State, no one variable could be found to adequately represent the concept of local development.

Book Reviews

Unemployment, Idle Capacity, and the Evaluation of Public Expenditures: National and Regional Analyses

By Robert H. Haveman and John V. Krutilla. Published for Resources for the Future, Inc., by the Johns Hopkins Press, Baltimore, Md. 1968. $6.50.

AGGREGATIVE ANALYSIS OF THE economy is becoming more disaggregated. For example, in this study impacts of public programs are assessed not in terms of changes in gross national product and total employment; rather, changes in each of 12 policies are traced through 82 industries, 156 occupations, and 10 geographic areas. The application is made to impacts of public water development projects such as building dams and dredging. The general results are succinctly summarized in the book and will be of value to those responsible for public water development projects. However, some specific findings might be more safely left in the hands of economists and mathematicians who are aware of the limitations of the analysis. To many readers of this journal, the book will be important as an example of method in aggregative analysis.

The approach is an interesting extension of input/output analysis. The authors used the 82-sector matrix available for the economy as of 1958:

$$Y = (I-A)X$$

where Y is a vector of final demands, X is an industry vector of gross outputs, and A is the production function. Adjusting for differences in years and dimensions, the authors drew upon the recently available industry/occupation matrix from the Bureau of Labor Statistics. With this matrix they could define:

$$E = BX$$

where E is a vector of employment by occupation and B is the matrix of occupational requirements by industry. By combining, it follows that:

$$E = B(I-A)^{-1} Y$$

so that small changes in final demands (ΔY) can be related to changes in labor requirements by occupation (ΔE).

The technique allows direct labor requirements needed at each project site to be compared with indirect labor requirements associated with purchases of goods and services needed to complete the project.

A further, enlightening extension provides a comparison of value added by the projects, including the distribution of value added among its several components such as wages and salaries, interest, taxes, and depreciation expense.

Insofar as the authors use water development project data for the ΔY's and trace impacts among industrial and occupational requirements, one can find little fault with the contributions of Haveman and Krutilla. However, as they proceed to compare changes in demand for labor with assumed labor supplies, and as they regionalize the model, they find themselves confronted with a need to make some additional assumptions. The assumptions are not realistic representations of the real world but at least they make the logical system operational and consequently are probably useful assumptions.

On the labor supply response, the authors assume that labor force participation rates and unemployment rates are known constants and apply an absorption model for using unemployed workers by occupation and region. This overlooks the important fact that labor force participation rates vary in elasticity, both by region and by occupation. Thus, they suppose that construction workers will respond with increased employment rather than demands for higher wages because they have relatively high rates of unemployment, and they suppose that real estate salesmen will respond with higher earnings rather than increased labor force participation because their rate of unemployment is relatively low. On these premises, the authors base their estimates of opportunity cost for each project.

On the regional distribution of impacts, assumptions are made that production functions in each region are the same as the national average, and that distribution coefficients among regions for each industry are known constants. It considerably improves the analysis to have the distribution coefficients vary among industrial

sectors according to whether demands originating in a specific region are assumed likely to be met from within the region or from the national market, or from some combination thereof. Even so, it is on these assumptions that the authors base their appraisals of regional impacts of each project.

While these two unrealistic sets of assumptions are likely to result in wrong answers to some details of the analysis, they may not undermine general conclusions at the more aggregative level: Which project tends to have a higher opportunity cost; and, which regions tend to benefit from projects. The authors compare impacts of water development projects with impacts of additions to GNP. The comparison suggests something about opportunity costs of water projects relative to uniform increases in aggregate demand for all final goods and services. They assess gains in flows of return relative to flows of cost without identifying the investment required in establishing stocks of services from which the gains are expected to flow.

The authors probably carried the study as far as they could and the book is well worth reading. The shortcomings in the book point to a shortage not of the analytic competence of these researchers or of the profession as a whole, but rather of available data for meaningful analysis of operational models for detailed public policy appraisal.

Clark Edwards

Rural Poverty in the United States

President's National Advisory Commission on Rural Poverty. U.S. Government Printing Office. 601 pages. 1968. $5.75.

READERS MAY RECALL Elizabeth B. Drew's stimulating article entitled "On Giving Oneself a Hotfoot: Government by Commission" in the May 1968 issue of the *Atlantic Monthly*. If not, a perusal of it would be a timely preparation for reading this report that contains papers prepared for the National Advisory Commission. These and other papers and testimony provided background information for the Commission in arriving at the recommendations submitted to the President in its report, *The People Left Behind*. (The Commission Report was reviewed by John H. Southern in the January 1968 issue.) These papers are grouped under five headings that relate rather unevenly to the 14 chapters of *The People Left Behind*. The five headings are: (1) Rural People and Their Communities; (2) Mobility and Migration; (3) Health and Family Planning; (4) Agriculture and Natural Resources; and (5) Economics of Poverty.

The 601 pages of 32 papers by many more authors plus 18 listed papers not published by the Commission represent a large effort by the Commission staff to obtain adequate technical briefing for the Commission. Economists and sociologists, in particular, will be interested in specific papers that attempt to capsule present knowledge on facets of rural poverty. Overall, the volume illustrates the complexity of rural poverty and the considerable scope remaining for defining and analyzing rural poverty and alternative remedies.

Subject matter ranges from "The Negro Population of the South" (chapter 2) through "Patterns of Urban Growth and Growth Nodes" (chapter 8), "Acceptance of a Family Planning Program by the Rural Poor: Summary of an Experiment in Alabama" (chapter 22), to "Negative Income Taxation as a Method of Income Maintenance" (chapter 32). Treatment of the subject matter likewise varies through general or global to local or case studies, and through analytical, descriptive, historical, and projective approaches. The format is quite variable. Perhaps significantly, as working materials for the Commission the summaries vary in scope and position; some papers lack summaries.

Economists and others may wish to develop needed case studies and other research suggested by the assertions and hypotheses in chapter 5, "Rural Community Institutions and Poverty, With Special Reference to Health and Education," by Thomas R. Ford (a Commission member and well-known student of Appalachia) and George A. Hillery, Jr. These writers advocate accelerated development of congruent service areas for rural people. An example of further laudably provocative commentary is:

"The current practice of some Federal agencies . . . of encouraging small, independent, and often uneconomical programs should be reviewed in the light of long-range objectives. There is no intrinsic reason why some of the more praiseworthy features of such programs, including the participation of the poor in self-help activities, cannot be incorporated within a more comprehensive and better coordinated framework of social action."

Wilbur R. Maki's survey in chapter 6, entitled "Infrastructure in Rural Areas," lists 207 references that provide economists with promising points of entry into broad economic questions of concern to rural people. Chapter 7, "Local Government and Poverty in Rural Areas" by Morton Lustig and Janet S. Rainer, extends the discussion of the previous two chapters and includes specific assertions, for example, Nesmith's reported findings that a "reasonable school system can be

supported by a total population of a little over 6,000; a supermarket needs almost 7,000 people and other types of business vary from 1,300 for a grocery, to 2,700 for a men's clothing store, and 6,700 for a hardware store; 5,000 population is a reasonable figure to support a library and five churches."

George H. Borts explores the role of "growth centers" in alleviating rural poverty and complementary upgrading of cities in chapter 9, "Patterns of Regional Economic Development in the United States, and Their Relation to Rural Poverty."

The massive chapter 13, "Occupational Mobility and Migration from Agriculture," is by Dale E. Hathaway and Brian E. Perkins. "This report covers what the authors believe to be the most extensive and comprehensive analysis done on occupational mobility and earnings experience through time." In view of this authorial statement and the acknowledged variance of several conclusions with "conventional theory and wisdom," a much more searching evaluation is warranted than this review can accommodate. The special characteristics of the data in relation to the definitions used and the conclusions drawn are fitting candidates for continued scrutiny by competent professionals.

Another Commission member, James T. Bonnen, wrote the highly numerical chapter 26 entitled "The Distribution of Benefits from Selected U.S. Farm Programs." The findings of chapter 27 ("Measuring the Effects of U.S. Department of Agriculture Programs on Income Distribution" by Vernon C. McKee and Lee M. Day) are suggestive of differences with those of Bonnen. Authors of both papers are careful to limit the scope of their findings, and the severity of the limits apparently needed is a sobering indictment of the extent of our present knowledge of programs commonly thought to be of central continuing importance.

Timely research by William McD. Herr is reported in chapter 28, "Credit and Farm Poverty." This conscientious analysis provides needed perspective on the extent of Federal involvement in programs to combat poverty. "Over half of the (400,000) younger farmers with chronically low incomes had outstanding debts in 1960. However, of those with debts, less than 5 percent were using FHA credit."

Who are the poor? The Commission and the papers published in this volume are obtusely passive, even apologetic on this question. The Commission accepted the poverty income levels developed by the Social Security Administration which modified the basic $3,000 income level according to family size and farm-nonfarm residence, except that the Commission called a farm family "poor" if it had less than 85 percent of the corresponding nonfarm family income, compared with 70 percent used by the Social Security Administration. The related staff paper by J. Patrick Madden, Jean L. Pennock, and Carol M. Jaegar is chapter 29, entitled "Equivalent Levels of Living: A New Approach to Scaling the Poverty Line to Different Family Characteristics and Place of Residence." Excerpts from a section on "Results of the Analysis" are: "1. Farm families in general, particularly renters, may require more than 70 percent–perhaps 80 or 85 percent–as much income as comparable urban families. 2. The farm-urban ratio varies from one region to another. . . . 3. Owners and renters may require a different ratio. . . . 4. The ratio may vary from one family size and type to another. . . ." Not surprisingly, the last section is entitled "Conclusions: Further Refinements Needed."

The "new approach" to defining poverty income levels implies a myopic and retrogressive perception of poverty. The "new approach" apparently accepts the assertion that it "costs less" to live on a farm and ignores the possibility that such apparent saving is likely to be an indication of at least commensurate lack of access to adequate community services and facilities and alternative training, income, and other employment and social opportunities. Moreover, higher nonfarm "poverty lines" can be thought to be an added inducement to off-farm migration at a time when the needs for neutralization of some perverse farm to city migration and for positive urbanization and settlement policies are widely espoused. Mechanically, the suggested refinements imply an infeasible level of accuracy in current income estimates.

Chapter 30, "Poverty Projections in Relation to Aggregate Demand, Economic Growth, and Unemployment," uses the "crude poverty line $3,000 family income" to reach this productive finding: "By the year 1975, even with a consistently favorable economic environment, including 3 percent unemployment, 4½ percent GNP growth rate, and 2 percent annual rise in price level, the Nation's poor families would still number about 6 million. About a fourth of these would be nonwhite."

Who are rural people? The Commission and its consultants are generally content to accept the 1910 Census definition whereby "rural" persons are those living in towns or communities with 2,500 people or less, or in open country. No central attention is given to needed potentially productive alternatives. What would the country look like when rural poverty (however defined) is eliminated? What are the feasible alternative settlement patterns and ways of living and working? And what are the implied costs of likely effective alternative

programs? The Commission could be expected to need briefings on such questions. The papers in this volume do not provide a sufficient basis for such briefings.

These Commission papers have opened Pandora's Box most aptly. If the lid had just been raised a little, professionals could have gathered great strength from the implied increases in scope and need for further research. Removing the lid has posed the potentially more productive question: Given the absurdly infinite scope for research implied by present programs, what novelties in program design and implementation will facilitate productive research support?

Alan R. Bird

Bargaining Power for Farmers

By National Farm Institute. The Iowa State University Press, Ames. 132 pages. 1968. $3.95.

CONTRIBUTORS TO THIS BOOK include well-known agricultural economists, representatives of general farm organizations and trade associations, Embassy officials of foreign countries, a newspaperman, a Senator, and the then Secretary of Agriculture. The book is the 1968 Proceedings Issue of the National Farm Institute. It comprises a series of 17 articles grouped into five major headings: (1) Can Farmers Control Prices and Production? (2) Farm Bargaining–How It Works, (3) Special Address, (4) Farm Bargaining and Its Effect on World Markets, and (5) Bargaining and World Markets.

The wide differences in the philosophies of general farm organizations are shown in statements of their spokesmen.

Oren Lee Staley, President of the National Farmers Organization, said that "producers must organize to solve their own problems" and that the best bargaining results are achieved when they have "the support of producers with courage, determination, and willingness to make sacrifices and achieve gains."

He believes strength must be demonstrated through withholding actions. While NFO supports legislative action to increase farm income, Staley does not believe new legislation is necessarily essential. He indicates a willingness, however, to ". . .advise NFO members to seal every bushel of grain that is eligible for loan to back up our all-commodity holding action. . . ."

Charles B. Shuman, President of the American Farm Bureau Federation, stated that "there are two ways to organize farmers to gain greater bargaining power–voluntary and involuntary." He then goes on to point out that the Farm Bureau advises the voluntary approach, an approach that he would also substitute for government–"the relatively free operation of the forces of supply and demand in the competitive market will result in higher prices than a politically managed market, providing we discontinue attempts to sell what we want to produce and are willing to produce what we can sell."

In contrast, Tony T. Dechant, President of the National Farmers Union, asked: "How can farmers, for example, strengthen their position in the market-place unless they are willing to participate fully in supply management?" To achieve this management he calls for legislative changes to strengthen the Sherman-Clayton Acts, as well as antitrust legislation. He stated further that "the Farmers Union is taking the back seat to no one in seeking a workable and effective and legal approach to greater farm bargaining power. . . . We want farmers to do the bargaining, with the government's role limited to guaranteeing their ability to do it."

Along somewhat the same lines, Harry L. Graham of The National Grange stated: "In any relationship that would develop in terms of bargaining association, the government has a place." He calls for supply management and outlines in detail an 11-point agreement program that he says represents the views of general farm organizations and the U.S. Department of Agriculture on the issues of bargaining.

The presentations by Professors Brandow, Babb, and Hoos help to bring basic issues into focus. These can be summarized as follows:

1. Is it possible to seek higher prices and at the same time permit unrestricted production?
2. What are the implications of a voluntary versus a compulsory approach to bargaining, particularly from the standpoint of influences on price, on production, and on foreign markets?
3. To what extent is "market mind" necessary to supplement "market muscle," if effective bargaining is to be achieved?
4. What are the relationships of marketing orders and marketing boards to bargaining and what is the role of cooperatives in making the use of these techniques effective?
5. Should bargaining be on a commodity-by-commodity basis or can it be "across the board" and on a national basis?
6. Are new types of cooperatives needed for bargaining or can this function be provided by existing cooperatives, alerted to the impacts of change and willing to adjust operations to new developments?

The section on Farm Bargaining is disappointing insofar as it relates to the impacts of world markets on bargaining activities. It contains a series of articles that describe the specific problems of various commodities. Except for the discussion by Senator Jack Miller of Iowa, who points out the relationship of Federal policy to bargaining, particularly as it concerns import and export policies, no identification is made of problems of foreign trade with bargaining. The discussion of bargaining and world markets varies in scope from considering the contributions of traditional cooperatives to marketing boards and commissions as instruments of achieving a national policy.

Students of bargaining agree that given effective leadership and realistic understanding of economic and political forces, bargaining can be a useful technique for farmers in improving (within reasonable limits) farm prices and market structure and performance. They emphasize that it is unrealistic to look on bargaining as a panacea for all farm problems. Rather, bargaining can be a useful tool for farmers when leadership is competent, economic conditions are favorable, and adequate governmental support is achieved and utilized.

Martin A. Abrahamsen

The Suburban Apartment Boom

By Max Nuetze. Published for Resources for the Future, Inc., by the Johns Hopkins Press, Baltimore, Md. 170 pages. 1968. $5.

THE PHENOMENON of skyrocketing suburban apartment construction in the 1960's after a downward trend in the 1950's is the subject of this research study. Max Nuetze, a senior lecturer on sabbatical leave from the Australian National University, analyzed the phenomenon and evaluated the significance of the trend in terms of land use.

The study finds out that the general boom cannot be entirely explained by activity in the limited urban land market which presumably increases residential density, or the high cost of building in central cities, or changes in taste of individuals. It concludes that the boom is due mainly to the increase in the proportion of the population in age groups who prefer the lower expenditure outlay for apartment living rather than single-family dwellings. The long-run trend toward one- and two-person households in both rural and urban areas was instrumental in the flight to the suburbs and in the correspondingly slow rate of inner city redevelopment. What is impressive is the magnitude of the boom rather than the nature of the construction. Apparently, apartment residents are simply following house-owners in demanding low-density living and the easier mobility which is possible in the suburbs.

This reviewer is puzzled about the statement as to the influence of land speculators on land use. The author states that land use in most cities has been influenced by speculation more than by public planning. However, he pointed out that speculators have found central cities to be relatively unfavorable for business ventures and seek more profitable areas in suburbia. Public planners in central cities through their jurisdictional powers and municipal support have potentially the greatest influence in construction by initiating and supervising housing and zoning regulations. The most important influence of land speculation results from the fact that one's own land becomes most valuable by enhancing the value of other people's land.

With regard to whether private or public decisions are more important to land development, the author examines the role business and Government should play in urban land markets. It is impossible for any fairly large city to have its land market operate under the mechanism of pure competition. Out of necessity the public sector must provide roads, water supply, and utilities such as transportation and electricity. Unfortunately, Government agencies sometimes operate as though they were competing firms by not taking advantage of their natural monopoly positions. Nevertheless, since Government operations can be done on a massive orderly scale, there is wisdom in permitting metropolitan areas to be essentially structured by Government investment rather than by unrestrained operations of land speculations.

The national breadth of suburban apartment construction is traced by means of an examination of the Washington metropolitan area—particularly Montgomery County, Md.—and through a comparison of 41 other large metropolitan areas. The author is astute in his use of statistical data, and his discussion of a theoretical model of land use is an honest attempt to determine the extent and character of suburban construction. He is considerate in cautioning the reader that the Washington metropolitan area is by no means typical of other parts of the country and that the theoretical arguments advanced require a great deal more empirical testing before they can be used with confidence.

Jack Ben-Rubin

The Economics of Foreign Aid

By Raymond F. Mikesell. Aldine Publishing Company, Chicago. 300 pages. 1968. $7.95.

THIS IS A MOST informative book about the economics (and some politics) of foreign aid. Mikesell has chosen a broad approach to the issues and problems of foreign aid. This, of course, will leave some readers unsatisfied with the lack of rigor with which some topics are treated. But on the other hand one gains a wide perspective of the many complex economic and political issues of foreign aid faced by both donor and recipient countries.

The author states the objectives of foreign aid in chapter 1. The most important are national security, humanitarian considerations, and national economic benefit. In discussing the relative weights given these objectives, Professor Mikesell realistically states that "... aid must be extended through governments and institutions reflecting the will of governments and it is at this point that political and security considerations become predominant." He goes on to say: "Just as it is difficult to prove that foreign aid can save the world for democracy it is also difficult to prove that it will *not* make a contribution to world stability and security. A decision to provide foreign economic assistance like most foreign-policy decisions, must be made on something other than the kind of evidence which constitutes acceptable proof of a hypothesis for the social scientists."

The author points out that whereas the developed countries increasingly view foreign aid as a joint responsibility, reflecting a common interest in world stability and an opportunity for the poor people of the world to enjoy the fruits of economic progress, the developing nations have come to regard foreign aid as an unconditional right. The developing countries hold a similar view with respect to improved trade opportunities.

Mikesell notes that views in developing countries on approaches to economic development are changing away from overemphasis on industrialization toward a more broadly based economic development, including more emphasis on agricultural development. "But changes in objectives are not enough; they must be accompanied by national policies designed to realize them."

The theories and strategies of economic development are reviewed in chapter 2 as a foundation for discussing foreign-aid theories and policies. Brief treatment is given to the classical and neoclassical economics of growth. The main thrust of the chapter, however, starts with a review of the Cobb-Douglas production function and the Harrod-Domar model. Mikesell is not fully satisfied with models of these types. "One of the disturbing things about modern growth theories for the economic planner or the foreign-aid policy maker is that economists have formulated a bewildering number of highly abstract models on the basis of stylized variables and assumptions regarding economic behavior and organization while at the same time readily admitting that the character and evolution of the noneconomic framework may be the major determinant of growth."

Historical stage theories of growth as well as social and cultural approaches are also reviewed.

In addition to general theories of growth, the author pays special attention to a number of specific development theories and strategies which have had a great impact on foreign aid policy and administration. These include (a) the critical rate of growth or minimum effort thesis; (b) the balanced growth or "big push" thesis; (c) the absorption of surplus labor approach; (d) theories emphasizing external trade and capital imports; and (e) theories of investment criteria.

Chapter 3 deals with the macroeconomics of aid and foreign aid theories. The author discusses three basic approaches to estimating foreign-aid requirements for developing countries: (1) the savings-investment gap approach; (2) the foreign-exchange earnings-expenditure gap approach; and (3) the capital-absorption approach. Several estimates of foreign aid requirements prepared by others are presented and discussed.

In chapter 4 the microeconomics of aid, including debt service models, debt service capacity, and loan terms, are discussed.

Different aid strategies are presented in chapter 5. Both project and program aid are discussed, with particular attention given to how program assistance can be used to support or achieve desired policy changes in the recipient country. Mikesell makes the point that "foreign aid is closely associated with economic performance in two basic ways. First, various types of aid may provide a means for *inducing* policies and programs which lead to improved economic performance. Second, aid may *facilitate* the implementation of policy measures for promoting improved performance necessary to achieve development goals.... Thus, the function of *concessionary* aid is not *primarily* to *supplement* the resources of the recipient but rather to help the recipient mobilize its own resources and perhaps to attract private and public nonconcessionary external capital for achieving its development goals." According to Mikesell, this view of foreign aid requires a disaggregated approach to assistance for overcoming strategic shortages which

appear in the process of domestic resource mobilization and redirection.

Chapters 6 and 7 deal with a number of key issues related to the types of development assistance. These include (a) project vs. program assistance; (b) agricultural commodity assistance; (c) aid through trade; (d) government guarantees of loans and direct investment, and (e) short-term balance of payments assistance.

In chapter 8 the burden of foreign aid on donor countries, including multilateral assistance efforts and tying of aid, are discussed.

Mikesell concludes that although most economic aid will be provided on a bilateral basis, efforts should be made to better coordinate various aid efforts–both bilateral and multilateral–to avoid duplication of efforts and to make economic assistance more effective in bringing about the desired policy and program changes in the recipient countries.

Professor Mikesell has written a valuable book on foreign aid. He clearly distinguishes between the important economic considerations and forces on the one hand, and the political and social factors on the other, involved in foreign aid and economic development. He does not reject the relevant economic theory, but clearly recognizes its shortcomings in the development of foreign aid policies and programs. This book should be a useful reference on the subject of foreign economic assistance.

Martin E. Abel

Agriculture's Import Saving Role: A Report by the Economic Development Committee for the the Agricultural Industry

By National Economic Development Office, London. Available from British Information Services, New York. 130 pages. 1968. $3.60.

AS THE UNITED KINGDOM is the world's largest importer of agricultural products, and a major market for U.S. tobacco, cereals, fruits, and vegetables (both fresh and processed), British agricultural import and export policies are of considerable concern to the United States. This is particularly true today, since official U.K. policy for the coming years envisions a selective expansion of British agriculture with the aim of reducing imports–a development which undoubtedly will create difficulties for U.S. efforts to increase certain agricultural exports.

A study which has a direct bearing and influence on current U.K. agricultural policy is the report prepared by the British Economic Development Committee (EDC). This committee is composed of representatives of government, management, and trade unions, and of independent members. In December 1966, it undertook a detailed study of the possible role of agriculture during 1972-73 and of its potential contribution to British import savings and the British economy as a whole. The Committee appointed working groups composed of representatives drawn from the constituent bodies of the EDC, as well as independent experts. The principal agricultural and food manufacturing organizations, individual firms and persons connected with the agricultural industry provided information and data.

The EDC study is based on two broad assumptions: that (1) "all import saving possibilities should be considered, whether or not they might conflict with Britains's present international commitments," and that (2) "over the next five years, the industry would not become subject to the common agricultural policy of the European Economic Community." The study examines the range of agricultural products grown in the United Kingdom, concentrating on those that appear to offer particular scope for import saving. Demand projections for 1972-73 for each of the main foodstuffs were made, taking into account rising population and possible changes in personal disposable incomes. Possibilities of expanding home production within the ceiling imposed by total demand were considered, first in terms of the upper limits of technical possibility and then scaled down in the light of practical considerations, to reach what the group regarded as a sound level of production at which to aim in 1972-73.

For each of the three sectors of agriculture–arable farming (cereals, flour, sugar, potatoes, peas, and beans), livestock, and horticulture (fruits and vegetables)–part I of the study sets forth the current situation on home production and imports and includes general observations on the outlook for each sector. It outlines the possible pattern of British agriculture by 1972-73 and the contribution it could make to import saving, and concludes with a statement about the conditions necessary for the implementation of the proposals for expansion. Part II presents detailed reports on individual products.

When the EDC submitted its report to the Ministries concerned in 1968, it expressed the hope that the report would provide a guide in determining longer-term policy for the British agricultural industry. On November 12, 1968, the U.K. Minister of Agriculture, Fisheries and Food discussed the report in his speech before the House

of Commons, outlining the United Kingdom's plan for agricultural expansion. He indicated that although the British Government will follow a more moderate policy than that recommended by the EDC, in certain areas it has welcomed and endorsed the EDC assessments. For example, while the U.K. Government favors broad expansion of cereal production, as does the EDC report, it considers the EDC estimates for achievement by 1972-73 as too optimistic. Moreover, while the report proposes a net import saving by 1972-73 of $543.2 million, the government has set the net import saving goal by that time at the lower figure of around $384 million. With regard to beef and milk production, however, the government has accepted the EDC proposals, as well as its proposals for the continued expansion of beef output from both beef and dairy herds.

The report prepared by the EDC is a significant and useful study, not only from the point of view of the U.K. Government to which it is addressed, but from that of U.S. agricultural economists, exporters, and farmers, who are concerned about the future of U.S. agricultural markets in Great Britain. The report is also useful for its individual commodity summaries which, taken together, contribute to an overall picture of present British agricultural production.

Marion M. Montague

Developing Rural India, Plan and Practice

By John W. Mellor, Thomas F. Weaver, Uma J. Lele, and Sheldon R. Simon. Cornell University Press, Ithaca, N.Y. 411 pages. 1968. $10.

INDIA'S EXPERIENCE IN PURSUIT of agricultural development deserves to be understood because India is intrinsically interesting, and because the pursuit has been more rationally managed and consistently maintained than anywhere else in the developing world. If the results have not all been up to expectation, the shortcomings themselves show the way to more effective efforts—in India and elsewhere.

Mellor describes with sympathy and understanding the evolution of rural development policy from Independence to the Fourth Plan. In his words, "By the standards of production increase, or of what is now known of the means of agricultural development, India's approach to agriculture is not very advanced. But viewed as a pragmatic process, that is, considering the knowledge upon which decisions were based, it comes out well. There has been an impressive capacity to change, to evolve policy in desirable directions, and thereby to set the stage for future increases in production." The standard, "what is now known of the means of agricultural development," excuses Indian planners for some of their mistakes since a good bit of what we know now, and our confidence in that knowledge, itself comes out of India's experience and the work of the students, Indian and foreign, who have been probing about on the scene of the action. Mellor argues "that Indian leaders had the capacity to learn from experience and hence have reaped benefits from all programs." No doubt, old writings could be found to demonstrate that somebody already knew at the start of Indian agricultural development, or even during colonial days, "what is now known." By now, however, some ideas that were wrong have been found out, there is greater unanimity about what "we" know rightly, and some imperatives have changed.

How Indian agricultural development efforts evolved is the subject of part I, by Mellor. With a broad brush (his own words) he simplifies, generalizes, and concludes on political and economic democracy, employment, food supply, irrigation, removal of exploitation, moneylenders, credit cooperatives, traders and service cooperatives, land tenure, farm structure, the Package Program, bad weather (1965-66), fertilizers, research, water, education of farmers, prices and marketing policy, and Indian planning procedures. Finally, he sets the stage for three brilliant case studies of farm production, marketing, and a village economy; fine examples of the kind of work that is gradually uprooting mistaken ideas about agricultural development.

Tom Weaver was sent to find out how the farmers of Raipur might most profitably allocate irrigation water between rice in one season and wheat in another. Analyzing physical production functions with a fine appreciation for biologically and economically significant features of the environment, he finds persuasive explanations for the refusal of Raipur farmers to adopt, extensively, long-standing recommendations of farm advisers to replace broadcast with transplanting methods of establishing paddy fields, and to grow a winter crop of wheat. He adds another impressive documentation of the crucial importance of technological bottlenecks; and more evidence undermining the myths that substantial agricultural progress is attainable in the less-developed world simply by using technical knowledge already on hand, and that failure of farmers to use the available knowledge is merely subservience to tradition and obtuseness in the face of promised progress. His chapter on social and economic change at work in the

Chhatisgarh region, Raipur District and Town, and the Kurmi caste is as interesting and significant as his analysis of technology.

Uma Lele worked in another part of India, curious and doubtful of the view prevalent in India and other underdeveloped countries that trade is unproductive, and traders mere exploiters of the rest of the community. The traders of Sholapur, she finds, were not averse to profits, but encountered definite limits to purely predatory tactics. Competition was a fact. Entry was not unencumbered, yet free enough to limit exploitation. Collusion was inhibited by the numbers of traders, the complexity of marketing channels, and the irresistible opportunity for the individual trader to make quick and sizable profits by making use of private information. Prices in Sholapur, neighboring district markets, and terminal markets were highly correlated. Deviations from the efficient model frequently were traced to breakdown of transport services, or to government bans on shipments. Seasonal price rises, also, were found to be far from a certain source of fat profits.

Sheldon Simon describes income, consumption, savings, and investment in Village Senapur, measuring the situation in 1964 against the benchmark provided by W. David Hopper 10 years earlier. The study illustrates intricate interrelationships among factors in the development process, and finds frequent contradictions of established views and generalizations with respect to monetization, indebtedness, sharecropping, and storage of agricultural commodities.

In the final chapter Mellor writes about prospects, problems, and lessons of Indian agricultural development. He thinks agricultural output can grow at a rate of 4.5 percent during the Fourth Plan. Two main potential sources of failure would be insufficient production of fertilizer, and inadequate expansion of the irrigation system. He warns of the need for a major research effort to provide an indispensable continuous flow of profitable innovation, but thinks that this is now sufficiently appreciated in India, and unlikely to be neglected. With respect to water, he is less optimistic. He finds a great need for research which will raise returns to investments under control of individual farmers, and which will improve larger decisions where lack of public knowledge may stifle development.

Reading this book will profit both newcomers and old hands to India. It is a good example of the manner and extent to which empiricism is making theory and policy of agricultural development increasingly relevant and useful throughout the developing world.

Louis F. Herrmann

Economic Development of Tropical Agriculture

Edited by W. W. McPherson. University of Florida Press, Gainesville. 328 pages. 1968. $8.50.

THIS BOOK, the first of a series of publications to be sponsored by the Center for Tropical Agriculture of the University of Florida, is a compilation of 15 seminars given at the University of Florida in 1966 by widely recognized authorities. Each seminar constitutes a chapter; a wide variety of topics are dealt with.

The introduction by the editor provides a summary of some of the main features in the present status of agriculture in the developing world as related to economic development. J. C. H. Fei and A. C. Chiang present a formal analysis to buttress their contention that either a steady improvement in technology or population control, or both, is required for economic progress. Gaitskell adeptly presents the case for complementary development of agriculture and industry. E. O. Heady contends that the mysteries of agricultural development are small in that farmers are universally responsive to prices of factors and products. More complex are the "outside" planning, policy, political, and cultural processes which provide restraints to agricultural growth. In discussing the world food problem, Heady emphasizes that producing farm products in the developed countries and sending them as gifts to the developing countries is not the long-run answer. Rather, it is essential that developing countries develop their own agriculture.

A chapter by R. A. King contends that the improvement of product markets should be an important component in any plan which seeks to accelerate the rate of economic growth in a region. Glenn Johnson's interesting discussion on factor markets draws heavily on his experiences in Nigeria. He states that the biggest problem in the operation of existing markets in Nigeria is government policies, especially the heavy rates of taxation which keep farm incomes low and distort investment in agriculture. Harry Johnson discusses the topic of trade preferences and developing countries. Particular attention is given to the proposal that temporary trade preferences in industrial products be granted by the advanced countries. M. R. Langham illustrates the use and discusses the potential and limitations of a dynamic linear programming model for development planning and analysis at the farm level. V. W. Ruttan discusses strategy for increasing rice production in the Philippines and Thailand. He concludes that both the yield increases and yield differences in the different regions of these two countries primarily reflect

variations in the environmental factors under which rice is grown rather than differences from variety planted or cultural practices. He goes on to state that if the investment devoted to development of new varieties is to achieve a reasonably high return, heavy investments in irrigation and in the fertilizer and insecticide industries plus increases in trained manpower will be required.

A. Gaitskell presents two area-oriented studies: one covering the Indus Basin of West Pakistan and the other dealing with Africa south of the Sahara. Gaitskell reviews these areas in terms of physical, political, social, and economic problems and potentials with emphasis on development policies. These chapters will be especially interesting to those who have limited acquaintance with these regions. J. P. Gittinger covers distinctive features of agriculture in low-income countries as related to problems of development planning and policies. J. W. Green compares and contrasts types of organizations which have been utilized for development in Pakistan, Rhodesia, and the Dominican Republic. In a following chapter, Green makes rather general statements with respect to advising someone who is going abroad to advise on local development organization in low-income countries. Finally, A. J. Coutu suggests some reasons for greater U.S. university involvement abroad.

The title of this book, and its cover containing an oil palm and a cassava plant, are misleading in that few of the topics discussed are primarily concerned with tropical agriculture per se. Rather the topics are primarily concerned with agriculture and economic development in general. However, the book is informative, thought-provoking, and well worth reading.

Lyle E. Moe

U.S. GOVERNMENT PRINTING OFFICE : 1969 O - 347-706

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2. CLEARANCE. Obtain any approval required in your own agency before sending your manuscript to one of the editors or assistant editors of Agricultural Economics Research.

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6. FOOTNOTES. Number consecutively throughout the paper.

7. REFERENCES. Check all references carefully for accuracy and completeness.

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U.S. DEPARTMENT OF AGRICULTURE
Economic Research Service
Washington, D.C. 20250

Official Business

AGRICULTURAL ECONOMICS RESEARCH

Is published quarterly by the Economic Research Service, U.S. Department of Agriculture. Use of funds for printing this publication approved by the Director of the Bureau of the Budget (February 3, 1969).

For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., 20402. 40 cents a single copy, $1.50 a year domestic, $2.00 foreign.